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Health and Environmental Effects Profile for TCMTB

(U.S.) Environmental Protection Agency
Cincinnati, OH

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HEALTH AND ENVIRONMENTAL EFFECTS PROFILE FOR TCMTB

ENVIRONMENTAL CRITERIA AND ASSESSMENT OFFICE
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16. ABSTRACT

The Health and Environmental Effects Profile for TCMTB was prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Solid Waste to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA). Both published literature and information obtained from Agency program office files were evaluated as they pertained to potential human health, aquatic life and environmental effects of hazardous waste constituents.

Quantitative estimates have been presented provided sufficient data are available. TCMTB has been determined to be a systemic toxicant. An Acceptable Daily Intake (ADI), defined as the amount of a chemical to which humans can be exposed on a daily basis over an extended period of time (usually a lifetime) without suffering a deleterious effect, for TCMTB is 2.5x10⁻² (mg/kg bw/day) for oral exposure.

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This document has been reviewed in accordance with U.S. Environmental Protection Agency policy and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

PREFACE

Health and Environmental Effects Profiles (HEEPs) are prepared for the Office of Solid Waste by the Office of Health and Environmental Assessment. The HEEPs are intended to support listings of hazardous constituents of a wide range of waste streams under Section 3001 of the Resource Conservation and Recovery Act (RCRA). Both published literature and information obtained from Agency program office files are evaluated as they pertain to potential human health, aquatic life and environmental effects of hazardous waste constituents. The literature searched and the dates of the searches are included in the section titled "Appendix: Literature Searched."

Quantitative estimates are presented provided sufficient data are available. For systemic toxicants, these include, Acceptable Daily Intakes (ADIs) for chronic exposures. An ADI is defined as the amount of a chemical to which humans can be exposed on a daily basis over an extended period of time (usually a lifetime) without suffering a deleterious effect. In the case of suspected carcinogens, ADIs are not estimated in this document series. Instead, a carcinogenic potency factor or q_1^* is provided. These potency estimates are derived for both oral and inhalation exposures where possible. In addition, unit risk estimates for air and drinking water are presented based on inhalation and oral data, respectively.

The first draft of this document was prepared by Syracuse Research Corporation under EPA Contract No. 68-03-3228. The document was subsequently revised after reviews by staff within the Office of Health and Environmental Assessment: Carcinogen Assessment Group, Reproductive Effects Assessment Group, Exposure Assessment Group, and the Environmental Criteria and Assessment Office in Cincinnati.

The HEEPs will become part of the EPA RCRA docket.

ACKNOWLEDGEMENTS

The initial draft of this report was prepared by Syracuse Research Corporation under Contract No. 68-03-3228 for U.S. EPA's Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. Dr. Christopher DeRosa was the Technical Project Monitor and Helen Ball was the Project Officer. The final documents in this series were prepared for the Office of Solid Waste, Washington, DC.

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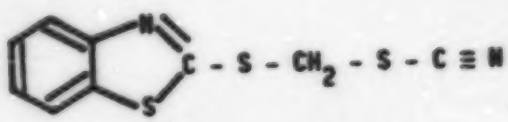
LIST OF ABBREVIATIONS

LC_{50}	Concentration lethal to 50% of recipients
LD_{50}	Dose lethal to 50% of recipients
ppm	Parts per million
TLV	Threshold limit value

1. INTRODUCTION

1.1. STRUCTURE AND CAS NUMBER

TCMTB is the acronym for 2-(thiocyanomethylthio)benzothiazole. It is also known as the 2-(benzothiazolylthio)methylester of thiocyanic acid, (2-benzothiazolylthio)methyl thiocyanate, Busan 15, Busan 30, Busan 72, Ichiban and KVK 733059 (NIOSH, 1983). The structure of TCMTB is given below (U.S. EPA/NIH, 1983):



The molecular formula for TCMTB is $C_9H_6N_2S_3$ and the molecular weight is 238.35. The Chemical Abstracts Services (CAS) Registry Number for TCMTB is 21564-17-0.

1.2. PHYSICAL AND CHEMICAL PROPERTIES

Pertinent data regarding the physical and chemical properties other than the melting point of TCMTB could not be located in the available literature. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

Melting point: 75-76°C (Goliash et al., 1963)

1.3. PRODUCTION DATA

TCMTB is produced by Buckman Laboratories, Inc., Memphis, TN. In 1975 <1 million pounds of the compound were produced (Ayers and Johnson, 1976). More recent production data could not be located in the available literature. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

1.4. USE DATA

TCNTB is used as a seed treatment and turf fungicide, an antifouling agent, a slimistat and a wood preservative. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

2. ENVIRONMENTAL FATE AND TRANSPORT PROCESSES

Moderate degradation of TCMTB by visible light was reported in an abstract of a Japanese study by Fuse and Tana (1981).

Dalton (1980a) of Buckman Laboratories, in an Italian paper not available for this report, discussed the biodegradability of TCMTB. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

3. EXPOSURE

Pertinent data regarding the measurement of TCMTB in the environment or elsewhere could not be located in the available literature. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

4. PHARMACOKINETICS

Pertinent data regarding the absorption, distribution, metabolism or excretion of TCMTB could not be located in the available literature. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

5. EFFECTS

5.1. CARCINOGENICITY

Pertinent data regarding the carcinogenicity of TCMTB could not be located in the available literature. It is not scheduled for testing by the National Toxicology Program (NTP, 1983).

5.2. MUTAGENICITY

The only mutagenicity information located was in an abstract of a Chinese publication (Jeang and Li, 1978) in which TCMTB was reported mutagenic in B. subtilis, but not in S. typhimurium. The absence of any experimental information, including endpoint measure, render this report useless.

5.3. TERATOGENICITY

Pertinent data regarding the teratogenicity of TCMTB could not be located in the available literature.

5.4. OTHER REPRODUCTIVE EFFECTS

Pertinent data regarding other possible reproductive effects of TCMTB could not be located in the available literature.

5.5. CHRONIC AND SUBCHRONIC EFFECTS

Pertinent data regarding the chronic or subchronic toxicity of TCMTB could not be located in the available literature. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

5.6. OTHER RELEVANT DATA

TCMTB has an acute oral LD_{50} of 1590 mg/kg in rats (NIOSH, 1983). Dalton (1980a,b) of Buckman Laboratories, in two Italian papers not available for this report, discussed the use and mammalian toxicity of TCMTB. (See Appendix for literature searched; also additional classified information is available. See Chapter 8 for a more complete explanation.)

6. AQUATIC TOXICITY

The acute toxicity of several commercial formulations of TCMTB have been determined in the harlequin fish, Rasbora heteromorpha (Tooby et al., 1975). These data are presented in Table 6-1 and represent concentrations of the commercial product rather than active ingredient. The 96-hour LC_{50} value for a 60% TCMTB formulation was 0.036. An estimated 3-month LC_{50} for 60% TCMTB in R. heteromorpha was 0.006 mg/ℓ (~0.0036 mg active ingredient/ℓ).

Additional data regarding the effects of TCMTB on aquatic organisms or the aquatic environment could not be located in the available literature.

TABLE 6-1

Acute Lethal Effects of TCMTB on Harlequin Fish[a]

Trade Names	Percent TCMTB	Duration	Effect	Concentration[b] (mg/L)
Busan 72	60	24 hours	LC_{10}	0.08
		24 hours	LC_{50}	0.13
		48 hours	LC_{10}	0.044
		48 hours	LC_{50}	0.075
		96 hours	LC_{10}	0.031
		96 hours	LC_{50}	0.036
		3 months[c]	LC_{50}	0.006
Busan 74	40[d]	24 hours	LC_{10}	0.12
		24 hours	LC_{50}	0.21
		48 hours	LC_{10}	0.052
		48 hours	LC_{50}	0.084
		96 hours	LC_{10}	0.035
		96 hours	LC_{50}	0.045
		3 months[c]	LC_{50}	0.001
Busan 25	30[d]	24 hours	LC_{10}	0.41
		24 hours	LC_{50}	0.58
		48 hours	LC_{10}	0.24
		48 hours	LC_{50}	0.35
		96 hours	LC_{10}	0.18
		96 hours	LC_{50}	0.21
		3 months[c]	LC_{50}	0.04
Busan 25	13.3[d]	24 hours	LC_{10}	0.60
		24 hours	LC_{50}	1.00
		48 hours	LC_{10}	0.43
		48 hours	LC_{50}	0.57
		96 hours	LC_{10}	0.34
		96 hours	LC_{50}	0.42
		3 months[c]	LC_{50}	0.07

[a]Source: Tooby et al., 1975

[b]Concentration stated as commercial product rather than active ingredient.

[c]Estimated from acute concentration-survival time data.

[d]Contains 2-hydroxypropyl-methanethiol sulfonate

7. EXISTING GUIDELINES AND STANDARDS

7.1. HUMAN

The U.S. EPA has determined that TCMTB residues are not expected to be found in meat, milk, poultry or eggs. A tolerance of 0.1 ppm has been established for residues in barley, corn, cottonseed, oats, rice and wheat (37 FR 25508; 35 FR 16974; 40 FR 33453; 40 CFR 180.288). The American Conference of Governmental Industrial Hygienists has not established a TLV for TCMTB (ACGIH, 1980, 1982).

7.2. AQUATIC

Guidelines and standards for the protection of aquatic organisms from the toxic effects of TCMTB have not been developed.

8. RISK ASSESSMENT

The available data are insufficient for the development of a quantitative risk assessment. The acute oral LD_{50} for TCMTB in rats is 1590 mg/kg (NIOSH, 1983). No other data regarding the potential health effects of this chemical could be located in the available literature.

Statements concerning available literature in this document refer to published, quotable sources and are in no way meant to imply that confidential data, which this document could not address, are not in existence. These data, which are considered Confidential Business Information (CBI), are available in summary form as a CBI Appendix that can be accessed by individuals with appropriate clearance. Conclusions from the CBI Appendix regarding risk assessment can, however, be presented in this chapter.

The CBI Appendix to this document reviews other animal data from which an ADI of 0.0254 mg/kg bw/day or 1.78 mg/day for a 70 kg man was derived. The ADI was based on a dietary NOEL of 333 ppm (equivalent to 25.4 mg/kg bw/day as calculated from food consumption and weight gain data provided in the report) in rats in a subchronic study and an uncertainty factor of 1000 (10 to account for interspecies extrapolation, 10 for protection of unusually sensitive individuals within the human population and 10 for the use of a subchronic NOEL for human ADI derivation). In the same study, a dietary level of 500 ppm, associated with inflamatory cell infiltration and edema in the stomach, was the LOAEL.

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U.S. EPA/NIH (U.S. Environmental Protection Agency/National Institute of Health). 1983. SANSS (Structure and Nomenclature Search System) Searched through C15. August, 1983: Online.

APPENDIX: LITERATURE SEARCHED

This profile is based on data identified by computerized literature searches of:

CA SEARCH (Files 308, 309, 310, 311, 320)
TOXLINE
MEDLINE
RTECS
SCI SEARCH
OHM TADS
STORET
SRC Environmental Fate Data Bases
SANSS
AQUIRE

These searches were conducted in July and August, 1983. In addition, hand searches were made of Chemical Abstracts (Collective Indices 6 and 7th), and the following secondary sources were reviewed:

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